CLAIMS:

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A leak detector comprising:

a sensing circuit including a first thermistor device adapted to detect a leak upon contact with a liquid, and, a second thermistor device functioning as a reference device;

means for driving said first and second thermistor devices with a current such that both said first and second thermistor devices operate in self-heated mode at a temperature above an ambient temperature; and,

a control system for controlling said driving means so as to maintain a constant application of power through both said first and second thermistor devices in response to a voltage V_s monitored at a reference point in a portion of said sensing circuit including said second thermistor device, said control system including means for monitoring the voltage V_s' at a reference point in a portion of said sensing circuit including said first thermistor device; and,

a comparing means for comparing the voltage V_s' at a reference point in said sensing circuit including said first thermistor device with the voltage V_s at a reference point in said sensing circuit including said second thermistor device and determining a leak condition on the basis of a comparison result irregardless of said ambient temperature.

2. The leak detector as claimed in Claim 1, wherein said means for monitoring the voltage at a reference point in said sensing circuit includes means for measuring said voltage V_s at a reference point in said sensing circuit connecting said second thermistor with a reference resistor connected in series therewith and further monitors a voltage characteristic V_s' at a reference point in said sensing circuit connecting said first thermistor to a further reference resistor connected in series, said control system comprising:

means for converting said measured voltage V_s into a corresponding digital signal; and,

controller means for processing said digital signal and generating a digital representation of a drive voltage value **V** to be applied to both said first and second thermistor devices of said sensing circuit by said driving means for driving said first and second thermistor devices at said constant power, said control system comprising a closed loop system.

3. The leak detector as claimed in Claim 2, wherein said control system further comprises a means for converting said digital value output of said controller means into said drive voltage **V**.

4. The leak detector as claimed in Claim 2, wherein the processing performed by said controller means for generating said voltage value comprises computing a drive voltage given the constant power requirement for operating said first and second thermistors in said self-heated mode and a value of a sense resistor connected in series with said reference thermistor.

5. The leak detector as claimed in Claim 3, wherein said means for converting said measured voltage V_s into a corresponding digital signal includes an analog-to-digital converter device.

6. The leak detector as claimed in Claim 3, wherein said means for converting said voltage value to be applied to said first thermistor device into a corresponding analog drive voltage **V** includes a digital-to-analog converter.

7. The leak detector as claimed in Claim 5, wherein said monitoring means includes a multiplexor device means for conducting said V_s and V_s' voltages at corresponding reference points in said sensing circuit to said analog-to-digital converter device, said first thermistor device producing a different voltage V_s' upon detection of a leak which is immediately detectable as a result of said comparison.

8. The leak detector as claimed in Claim 3, wherein said monitoring means and said controller means are programmed to obtain the reference voltages **Vs** and V_s' periodically,

wherein a leak is detected if said **Vs** and V_s' differ by an amount to indicate a change in temperature due to said first thermistor coming into contact with a liquid.

9. The leak detector as claimed in Claim 1, further adapted to detecting an air flow condition, said first thermistor device in self-heated mode functioning as a sensor thermistor for detecting an air flow condition and said second thermistor device in self-heated mode functioning as a reference thermistor subject to stagnant air.

10. A method for detecting leaks in an instrument, said method comprising:

a) driving a leak detector circuit in a manner so as to provide constant power dissipation in both a first thermistor device adapted to detect a leak upon contact with a liquid and a second thermistor device functioning as a reference device, said first and second thermistor devices adapted to being driven with a current to operate in self-heated mode at a temperature above an ambient temperature;

b) receiving a first voltage V_s' at a reference point in said leak detector circuit that connects said first reference thermistor device and a first resistor device connected in series, and receiving a second voltage V_s at a reference point in said leak detector circuit that connects said second reference thermistor device and a second resistor device connected in series; and,

c) comparing said first V_s' and second V_s voltages; and,

d) determining a leak condition on the basis of a comparison result irregardless of said ambient temperature.

11. The method for detecting leaks as claimed in Claim 10, wherein said driving step a) comprises the steps of:

monitoring a voltage $\mathbf{V_s}$ at a reference point in a portion of said sensing circuit connecting said second thermistor device with a reference resistor connected in series therewith;

converting said measured voltage $\mathbf{V_s}$ into a corresponding digital signal; and,

processing said digital signal and generating a digital representation of a drive voltage value **V** to be applied to both said first and second thermistor devices of said sensing circuit by a driving means for driving said first and second thermistor devices at said constant power; and,

converting said generated digital representation into said drive voltage **V**.

12. The method for detecting leaks as claimed in Claim 11, wherein the processing step includes computing a drive voltage value given a constant power requirement for operating said first and second thermistors in said self-heated mode and a value of a sense resistor connected in series with said reference thermistor.

13. The method for detecting leaks as claimed in Claim 11, wherein said step of converting said measured voltage $\mathbf{V_s}$ into a corresponding digital signal includes implementing an analog-to-digital converter device.

14. The method for detecting leaks as claimed in Claim 11, wherein said step of converting said generated digital representation includes implementing a digital-to-analog converter device.

15. The method for detecting leaks as claimed in Claim 13, wherein said step b) of receiving a first voltage $\mathbf{V_s'}$ at a reference point and receiving a second voltage $\mathbf{V_s}$ includes the step of multiplexing said first voltage $\mathbf{V_s'}$ and second voltage $\mathbf{V_s}$ to said analog-to-digital

converter device, said first thermistor device producing a different voltage V_s' upon detection of a leak which is immediately detectable as a result of said comparison.

16. The method for detecting leaks as claimed in Claim 13, wherein said step b) of receiving a first voltage V_s' at a reference point and receiving a second voltage V_s is performed periodically.

17. A control circuit for a detector device comprising a sensing circuit including a first thermistor device adapted to detect an environmental condition, and, a second thermistor device functioning as a reference device, said control circuit comprising:

means for driving said first and second thermistor devices with a current such that both manner such that said first and second thermistor devices operate in self-heated mode at a temperature above an ambient temperature; and,

means for monitoring a voltage V_s at a reference point in a portion of said sensing circuit connecting said second thermistor device with a sense resistor;

a control system for controlling said driving means so as to maintain a constant application of power through both said first and second thermistor devices in response to said voltage V_s, said means additionally monitoring a voltage V_s' at a reference point in a portion of said sensing circuit including said first thermistor device; and,

a comparing means for comparing the voltage V_s' at a reference point in said sensing circuit including said first thermistor device with the voltage V_s at a reference point in said sensing circuit including said second thermistor device and detecting said environmental condition on the basis of a comparison result irregardless of said ambient temperature.

18. The control circuit as claimed in Claim 17, wherein said sensing circuit detects an environmental condition comprising the presence of a liquid contacting said first thermistor device.

19. The control circuit as claimed in Claim 17, wherein said sensing circuit detects an environmental condition comprising the presence of an air flow contacting said first thermistor device.

20. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for detecting leaks in an instrument, said method steps comprising:

a) driving a leak detector circuit in a manner so as to provide constant power dissipation in both a first thermistor device adapted to detect a leak upon contact with a liquid and, a second thermistor device functioning as a reference device, said first and second thermistor devices adapted to being driven with a current to operate in self-heated mode at a temperature above an ambient temperature;

b) receiving a first voltage $\mathbf{V_s'}$ at a reference point in said leak detector circuit that connects said first reference thermistor device and a first resistor device connected in series, and receiving a second voltage $\mathbf{V_s}$ at a reference point in said leak detector circuit that connects said second reference thermistor device and a second resistor device connected in series; and,

c) comparing said first $\mathbf{V_s'}$ and second $\mathbf{V_s}$ voltages; and,

d) determining a leak condition on the basis of a comparison result irregardless of said ambient temperature.

21. The program storage device readable by a machine as claimed in Claim 20, wherein said driving step a) comprises the further method steps of:

monitoring a voltage $\mathbf{V_s}$ at a reference point in a portion of said sensing circuit connecting said second thermistor device with a reference resistor connected in series therewith;

converting said measured voltage $\mathbf{V_s}$ into a corresponding digital signal;

processing said digital signal and generating a digital representation of a drive voltage value **V** to be applied to both said first and second thermistor devices of said sensing circuit

by a driving means for driving said first and second thermistor devices at said constant power; and,

converting said generated digital representation into said drive voltage V.

22. The program storage device readable by a machine as claimed in Claim 21, wherein the processing step includes computing a drive voltage value given a constant power requirement for operating said first and second thermistors in said self-heated mode and a value of a sense resistor connected in series with said reference thermistor.

23. The program storage device readable by a machine as claimed in Claim 21, wherein said step b) of receiving a first voltage V_s' at a reference point and receiving a second voltage V_s includes the step of multiplexing said first voltage V_s' and second voltage V_s to an analog-to-digital converter device for converting said measured voltages into corresponding digital signals.

24. The program storage device readable by a machine as claimed in Claim 21, wherein said step b) of receiving a first voltage V_s' at a reference point and receiving a second voltage V_s is performed periodically.